



Complete Summary

TITLE

Asthma admission rate (area level): rate per 100,000 population.

SOURCE(S)

AHRQ quality indicators. Pediatric quality indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Feb 29. various p.

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

Measure Domain

PRIMARY MEASURE DOMAIN

Population Health

The validity of measures depends on how they are built. By examining the key building blocks of a measure, you can assess its validity for your purpose. For more information, visit the [Measure Validity](#) page.

SECONDARY MEASURE DOMAIN

Does not apply to this measure

Brief Abstract

DESCRIPTION

This measure is used to assess the number of patients admitted for asthma per 100,000 population.

RATIONALE

This indicator is intended to identify hospitalizations for asthma, where asthma is identified as the principal reason for hospitalization. Guidelines outline maintenance therapy, including drug treatments, which may reduce the incidence of acute exacerbations requiring hospitalization.

PRIMARY CLINICAL COMPONENT

Pediatric asthma; hospital admission rates

DENOMINATOR DESCRIPTION

Population ages 2 to 17 years in Metro Area or county

NUMERATOR DESCRIPTION

Discharges ages 2 to 17 years with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) principal diagnosis code of asthma

Exclude cases:

- Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium)
- transfer from other institution
- age less than 2 years
- with diagnosis code for cystic fibrosis and anomalies of the respiratory system

Note: Refer to the original measure documentation for specific ICD-9-CM codes.

Evidence Supporting the Measure

EVIDENCE SUPPORTING THE VALUE OF MONITORING THE ASPECT OF POPULATION HEALTH

- A formal consensus procedure involving experts in relevant clinical, methodological, and organizational sciences
- One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Evidence Supporting Need for the Measure

NEED FOR THE MEASURE

Variation in health state(s)

EVIDENCE SUPPORTING NEED FOR THE MEASURE

Billings J, Zeital L, Lukomnik J, Carey T, Blank A, Newman L. Analysis of variation in hospital admission rates associated with area income in New York City [unpublished].

Lin S, Fitzgerald E, Hwang SA, Munsie JP, Stark A. Asthma hospitalization rates and socioeconomic status in New York State (1987-1993). J Asthma 1999 May;36(3):239-51. [PubMed](#)

Lozano P, Connell FA, Koepsell TD. Use of health services by African-American children with asthma on Medicaid. JAMA1995 Aug 9;274(6):469-73. [PubMed](#)

Millman M, editor(s). Access to health care in America. Committee on Monitoring Access to Personal Health Care Services. Washington (DC): National Academy Press; 1993. 240 p.

Murray MD, Stang P, Tierney WM. Health care use by inner-city patients with asthma. J Clin Epidemiol1997 Feb;50(2):167-74. [PubMed](#)

Ray NF, Thamer M, Fadillioglu B, Gergen PJ. Race, income, urbanicity, and asthma hospitalization in California: a small area analysis. Chest1998 May;113(5):1277-84. [PubMed](#)

State of Use of the Measure

STATE OF USE

Current routine use

CURRENT USE

Monitoring health state(s)
National reporting

Application of Measure in its Current Use

CARE SETTING

Ambulatory Care
Community Health Care

PROFESSIONALS RESPONSIBLE FOR HEALTH CARE

Advanced Practice Nurses
Physician Assistants
Physicians
Public Health Professionals

LOWEST LEVEL OF HEALTH CARE DELIVERY ADDRESSED

Counties or Cities

TARGET POPULATION AGE

Age greater than or equal to 2 years and less than 18 years

TARGET POPULATION GENDER

Either male or female

STRATIFICATION BY VULNERABLE POPULATIONS

Unspecified

Characteristics of the Primary Clinical Component

INCIDENCE/PREVALENCE

Unspecified

ASSOCIATION WITH VULNERABLE POPULATIONS

Numerous studies have shown that asthma hospitalization rates are associated with socioeconomic factors, including median household income (at the area level) and lack of insurance (at the individual level). A study of asthma hospitalization rates in California in 1993 (ages 0 to 64) found that areas with median household incomes under \$35,000 had hospitalization rates that were 1.5 times higher than areas with higher median incomes. In Boston, in 1992, age and gender standardized hospitalization rates (all ages) were correlated with percentage poverty in an area ($r=0.68$), percentage holding a bachelor's degree ($r=-0.61$), and income ($r=-0.51$). Within New York City in 1994, asthma hospitalization rates were negatively correlated with a zip code area's median household income ($r=-0.67$), and positively correlated with the percentage of minorities in the population ($r=0.82$). These findings confirm an earlier study by Billings et al., who reported 6.4-fold variation in asthma hospitalization rates (age 0 to 64) at the zip code level in New York City in 1988, with 70% of this variation explainable by the percentage of households with annual income below \$15,000. Millman et al. reported that low-income zip codes had 5.8 times more asthma hospitalizations per capita (age 0 to 64) than high-income zip codes in 11 states in 1988. Using New York State data, Lin et al. showed that hospitalization rates were higher in areas with higher poverty, unemployment, minority populations, and lower education levels. Even in England, 45% of the variation in asthma hospitalization rates across 90 family health services authorities in 1990-95 was attributable to socioeconomic factors, plus the availability of secondary care. To the measure developer's knowledge, only one study has reported partial correlations; it found that in New York City, the percentage of African-American residents (age 0 to 34) was the strongest predictor, and median household income was the next strongest predictor, of asthma hospitalization rates.

The observation that asthma admission rates are higher in areas with low socioeconomic status (SES) has led some researchers to hypothesize that lack of access to care, or poor quality outpatient care, may lead to higher admission rates. Although analyses of the National Health and Nutrition Examination Survey found that Medicaid enrollment and Spanish language preference were associated with inadequate asthma therapy, these deficiencies in care were not directly linked to hospitalizations in children. Studies from other settings have shown that African-American asthmatics tend to have fewer scheduled primary care visits, and more hospitalizations and emergency room visits, than White asthmatics.

African-Americans' use of asthma medications in children may also be less consistent with current practice guidelines.

Few studies have directly linked high-quality processes of outpatient care with lower hospitalization rates at either the area or the individual level. An in-depth study of asthma treatment practices in New Haven, Boston, and Rochester found that the community with the highest asthma hospitalization rate (Boston) also had lower use of inhaled anti-inflammatory agents and oral steroids. The threshold for admission also appeared to be lower in Boston, as fewer of the admitted children were hypoxemic, relative to the other cities. One case control study from a large health maintenance organization established that not having a written asthma management plan was a strong risk factor for asthma hospitalization in children (after adjusting for severity of asthma), but the use of anti-inflammatory medications was not. More recent studies have confirmed that continuity of care with the same provider and a comprehensive asthma care program decrease the risk of emergency department (ED) visits and hospitalization for asthma. The risk of hospital admission was lower when clinical pathways were used for asthmatic children in emergency rooms of Australian hospitals. In another Australian study, having a written asthma action plan contributed to a reduction in hospital and emergency department attendance.

With patient and parent education, good medical therapy, and outreach programs, adverse outcomes for children can be reduced considerably. For example, Medicaid health maintenance organization (HMO) enrollees had higher age-gender-race adjusted asthma hospital discharge rates than Medicaid recipients enrolled in primary care case management program under fee-for-service reimbursement. On the other hand, experience with Child Health Plus (CHPlus), a health insurance program providing ambulatory and ED coverage for uninsured and low-income children (0 to 13 years) in New York, suggests that some access-improving interventions do NOT reduce asthma hospitalization rates. Visit rates, follow-up visits, and total visits to primary care providers were significantly higher during CHPlus than before enrollment. There was no significant association between CHPlus coverage and ED visits or hospitalizations for asthma, although specialty utilization increased.

EVIDENCE FOR ASSOCIATION WITH VULNERABLE POPULATIONS

Anis AH, Lynd LD, Wang XH, King G, Spinelli JJ, Fitzgerald M, Bai T, Pare P. Double trouble: impact of inappropriate use of asthma medication on the use of health care resources. *CMAJ*2001 Mar 6;164(5):625-31. [PubMed](#)

Billings J, Zeital L, Lukomnik J, Carey T, Blank A, Newman L. Analysis of variation in hospital admission rates associated with area income in New York City [unpublished].

Bosco LA, Gerstman BB, Tomita DK. Variations in the use of medication for the treatment of childhood asthma in the Michigan Medicaid population, 1980 to 1986. *Chest*1993 Dec;104(6):1727-32. [PubMed](#)

Browne GJ, Giles H, McCaskill ME, Fasher BJ, Lam LT. The benefits of using clinical pathways for managing acute paediatric illness in an emergency department. *J Qual Clin Pract*2001 Sep;21(3):50-5. [PubMed](#)

Garland JS, Henrickson K, Maki DG, Hospital Infection Control Practices Advisory Committee Centers for Disease Control and Prevention. The 2002 Hospital Infection Control Practices Advisory Committee Centers for Disease Control and Prevention guideline for prevention of intravascular device-related infection. *Pediatrics*2002 Nov;110(5):1009-13. [PubMed](#)

Gottlieb DJ, Beiser AS, O'Connor GT. Poverty, race, and medication use are correlates of asthma hospitalization rates. A small area analysis in Boston. *Chest*1995 Jul;108(1):28-35. [PubMed](#)

Greineder DK, Loane KC, Parks P. A randomized controlled trial of a pediatric asthma outreach program. *J Allergy Clin Immunol*1999 Mar;103(3 Pt 1):436-40. [PubMed](#)

Halterman JS, Aligne CA, Auinger P, McBride JT, Szilagyi PG. Inadequate therapy for asthma among children in the United States. *Pediatrics*2000 Jan;105(1 Pt 3):272-6. [PubMed](#)

Homer CJ, Szilagyi P, Rodewald L, Bloom SR, Greenspan P, Yazdgerdi S, Leventhal JM, Finkelstein D, Perrin JM. Does quality of care affect rates of hospitalization for childhood asthma. *Pediatrics*1996 Jul;98(1):18-23. [PubMed](#)

Lieu TA, Quesenberry CP Jr, Capra AM, Sorel ME, Martin KE, Mendoza GR. Outpatient management practices associated with reduced risk of pediatric asthma hospitalization and emergency department visits. *Pediatrics*1997 Sep;100(3 Pt 1):334-41. [PubMed](#)

Lin S, Fitzgerald E, Hwang SA, Munsie JP, Stark A. Asthma hospitalization rates and socioeconomic status in New York State (1987-1993). *J Asthma*1999 May;36(3):239-51. [PubMed](#)

Lozano P, Connell FA, Koepsell TD. Use of health services by African-American children with asthma on Medicaid. *JAMA*1995 Aug 9;274(6):469-73. [PubMed](#)

Lwebuga-Mukasa JS, Pszonak R. Patterns of inpatient and outpatient care for asthma in Erie and Niagara Counties, western New York State. *J Asthma*2001 Apr;38(2):155-60. [PubMed](#)

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Murray MD, Stang P, Tierney WM. Health care use by inner-city patients with asthma. *J Clin Epidemiol*1997 Feb;50(2):167-74. [PubMed](#)

O'Grady NP, Alexander M, Dellinger EP, Gerberding JL, Heard SO, Maki DG, Masur H, McCormick RD, Mermel LA, Pearson ML, Raad II, Randolph A, Weinstein RA. Guidelines for the prevention of intravascular catheter-related infections. *Pediatrics*2002 Nov;110(5):e51. [PubMed](#)

Pollack RN, Buchman AS, Yaffe H, Divon MY. Obstetrical brachial palsy: pathogenesis, risk factors, and prevention. Clin Obstet Gynecol 2000 Jun;43(2):236-46. [28 references] [PubMed](#)

Ray NF, Thamer M, Fadillioglu B, Gergen PJ. Race, income, urbanicity, and asthma hospitalization in California: a small area analysis. Chest 1998 May;113(5):1277-84. [PubMed](#)

Weissman JS, Gatsonis C, Epstein AM. Rates of avoidable hospitalization by insurance status in Massachusetts and Maryland. JAMA 1992 Nov 4;268(17):2388-94. [PubMed](#)

Woolcock AJ, Bastiampillai SA, Marks GB, Keena VA. The burden of asthma in Australia. Med J Aust 2001 Aug 6;175(3):141-5. [PubMed](#)

BURDEN OF ILLNESS

Unspecified

UTILIZATION

See the "Association with Vulnerable Populations" field.

COSTS

Unspecified

Institute of Medicine National Healthcare Quality Report Categories

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness
Timeliness

Data Collection for the Measure

CASE FINDING

Both users and nonusers of care

DESCRIPTION OF CASE FINDING

Population ages 2 to 17 years in Metro Area or county

DENOMINATOR SAMPLING FRAME

Geographically defined

DENOMINATOR INCLUSIONS/EXCLUSIONS

Inclusions

Population ages 2 to 17 years in Metro Area or county

Exclusions

Unspecified

RELATIONSHIP OF DENOMINATOR TO NUMERATOR

All cases in the denominator are not equally eligible to appear in the numerator

DENOMINATOR (INDEX) EVENT

Patient Characteristic

DENOMINATOR TIME WINDOW

Time window is a single point in time

NUMERATOR INCLUSIONS/EXCLUSIONS

Inclusions

Discharges ages 2 to 17 years with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) principal diagnosis code of asthma

Exclusions

Exclude cases:

- Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium)
- transfer from other institution
- age less than 2 years
- with diagnosis code for cystic fibrosis and anomalies of the respiratory system

Note: Refer to the original measure documentation for specific ICD-9-CM codes.

MEASURE RESULTS UNDER CONTROL OF HEALTH CARE PROFESSIONALS, ORGANIZATIONS AND/OR POLICYMAKERS

The measure results are somewhat or substantially under the control of the health care professionals, organizations and/or policymakers to whom the measure applies.

NUMERATOR TIME WINDOW

Institutionalization

DATA SOURCE

Administrative data

LEVEL OF DETERMINATION OF QUALITY

Does not apply to this measure

TYPE OF HEALTH STATE

Adverse Health State

PRE-EXISTING INSTRUMENT USED

Unspecified

Computation of the Measure

SCORING

Rate

INTERPRETATION OF SCORE

A lower score is desirable

ALLOWANCE FOR PATIENT FACTORS

Analysis by high-risk subgroup (stratification on vulnerable populations)
Analysis by subgroup (stratification on patient factors, geographic factors, etc.)
Risk adjustment method widely or commercially available

DESCRIPTION OF ALLOWANCE FOR PATIENT FACTORS

Risk adjustment of the data is recommended using, at minimum, age and sex.

Application of multivariate signal extraction (MSX) to smooth risk adjusted rates is also recommended.

STANDARD OF COMPARISON

Internal time comparison

Evaluation of Measure Properties

EXTENT OF MEASURE TESTING

The development of the Agency for Healthcare Research and Quality (AHRQ) Pediatric Quality Indicators utilizes a four pronged approach: identification of candidate indicators, literature review, empirical analyses, and panel review. Candidate indicators were identified through both published literature and a brief

survey of national organizations. Literature review provided descriptions and evaluations of some candidate indicators and the underlying relationship to quality of care. Empirical analyses were conducted to explore alternative definitions; to assess nationwide rates and hospital variation; and to develop appropriate methods to account for variation in risk. Clinical panel review helped to refine indicator definitions and risk groupings, and to establish face validity in light of the limited evidence from the literature for most pediatric indicators. Information from these sources was used to specify indicator definitions and make recommendations to AHRQ regarding the best indicators for inclusion in the pediatric indicator set.

A structured review of each indicator was undertaken to evaluate face validity (from a clinical perspective). This process mirrored that undertaken during the initial development of the Patient Safety Indicators. Specifically, the panel approach established *consensual validity*, which "extends face validity from one expert to a panel of experts who examine and rate the appropriateness of each item...." The methodology for the structured review was adapted from the RAND/UCLA Appropriateness Method and consisted of an initial independent assessment of each indicator by clinician panelists using an initial questionnaire, a conference call among all panelists, followed by a final independent assessment by clinician panelists using the same questionnaire. The panel process served to refine definitions of some indicators, add new measures, and dismiss indicators with major concerns from further consideration.

Empirical analyses were conducted to provide the clinical panels and peer review participants with additional information about the indicators. These analyses were also used by the development team to test the alternative specifications and the relative contribution of indicator components in the numerator and denominator. These analyses were not intended to inform issues of precision, bias and construct validity, which will be addressed separately. The data source used in the empirical analyses was the 2003 Kids' Inpatient Sample (KID).

Refer to the original measure documentation for additional details.

EVIDENCE FOR RELIABILITY/VALIDITY TESTING

Fitch K, Bernstein SJ, Aguilar MD, et al. The RAND/UCLA appropriateness method user's manual. Santa Monica (CA): RAND; 2001. 109 p.

Green L, Lewis F. Measurement and evaluation in health education and health promotion. Mountain View (CA): Mayfield Publishing Company; 1998.

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

Identifying Information

ORIGINAL TITLE

Asthma admission rate (PDI 14).

MEASURE COLLECTION

[Agency for Healthcare Research and Quality \(AHRQ\) Quality Indicators](#)

MEASURE SET NAME

[Agency for Healthcare Research and Quality \(AHRQ\) Pediatric Quality Indicators](#)

DEVELOPER

Agency for Healthcare Research and Quality

INCLUDED IN

National Healthcare Disparities Report (NHDR)
National Healthcare Quality Report (NHQR)

ADAPTATION

This measure was adapted from the AHRQ Prevention Quality Indicators.

PARENT MEASURE

Pediatric asthma admission rate (PQI 4) (Agency for Healthcare Research and Quality [AHRQ])

RELEASE DATE

2006 Feb

REVISION DATE

2008 Feb

MEASURE STATUS

This is the current release of the measure.

SOURCE(S)

AHRQ quality indicators. Pediatric quality indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Feb 29. various p.

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

MEASURE AVAILABILITY

The individual measure, "Asthma Admission Rate (PDI 14)," is published in "Measures of Pediatric Health Care Quality Based on Hospital Administrative Data: The Pediatric Quality Indicators" and "AHRQ Quality Indicators. Pediatric Quality Indicators: Technical Specifications [version 3.2]." These documents are available in Portable Document Format (PDF) from the [Pediatric Quality Indicators Download](#) page at the Agency for Healthcare Research and Quality (AHRQ) Quality Indicators Web site.

For more information, please contact the QI Support Team at support@qualityindicators.ahrq.gov.

COMPANION DOCUMENTS

The following are available:

- AHRQ quality indicators. Pediatric quality indicators: software documentation [version 3.2] - SAS. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar 10. 40 p. This document is available in Portable Document Format (PDF) from the [AHRQ Quality Indicators Web site](#).
- AHRQ quality indicators. Software documentation: Windows [version 3.1a]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Apr 6. 99 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- Pediatric quality indicators (PedQI): covariates [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 52 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- Pediatric quality indicators (PedQI): covariates (with POA) [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 52 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- HCUPnet. [internet]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2004 [accessed 2007 May 21]. [Various pagings]. HCUPnet is available from the [AHRQ Web site](#). See the related [QualityTools](#) summary.

NQMC STATUS

This NQMC summary was completed by ECRI Institute on December 28, 2007. The information was verified by the measure developer on March 31, 2008.

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